

Amendment and Response Under 37 C.F.R. 1.116

Applicant: Josef Böck et al.
Serial No.: 10/521,106
Filed: September 13, 2005
Docket No.: I435.121.101/12307US
Title: **BIPOLAR TRANSISTOR**

REMARKS

The following remarks are made in response to the Final Office Action mailed August 23, 2006. Claims 25-26 have been cancelled. Claims 9, 12-16, and 24-29 were rejected. With this Response, claims 9, 24 and 27 have been amended and claim 33 added. Claims 9, 12-16, 24, 27-29 and 33 remain pending in the application and are presented for reconsideration and allowance.

Claim Rejections under 35 U.S.C. § 103

The Examiner rejected claims 9, 12-13, 15-16, 24-26, and 28-29 under 35 U.S.C. 103(a) as being unpatentable over the Higuchi U.S. Patent No. 5,407,857 in view of the Kalnitsky et al. U.S. Patent No. 6,593,640. The Examiner rejected claims 14 and 27 under 35 U.S.C. 103(a) as being unpatentable over the Oda et al. U.S. Patent No. 6,521,974.

As described in amended claim 9, an embodiment of the invention includes a bipolar transistor including an emitter area, a base area, and a collector area. The emitter area can be contacted electrically via an emitter electrode. The base area can be contacted electrically via a base electrode. The collector area can be contacted electrically via a collector electrode. At least one electrode of the emitter electrode, base electrode and collector electrode is a polysilicon layer, into which doping is inserted and impurity atoms are inserted. The inserting of the impurity atoms causes a high density of vacancies in the polysilicon layer in the range of about 10^{19} to 10^{21} cm⁻³. The impurity atoms are C, P or Ar atoms. It is the particular combination of dopant atoms with the impurity concentration that is now defined in the claims that achieves the reduction in the electrode resistance.

The Examiner has asserted in the prior office action that Kalnitsky et al. discloses the use of both impurities and dopant atoms in a polysilicon layer of a bipolar device. The Kalnitsky reference is silent, however, on defining the concentration both of the impurities and the dopant atoms in any meaningful detail. Instead, Kalnitsky et al. only roughly proposes an impurity concentration of about 1%, but is silent about the dopant concentration. As such, it does not teach or suggest the elements of the pending claims.

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Furthermore, Higuchi does not teach any impurity atoms in addition to dopant atoms. Instead, Higuchi only discloses the implantation of polysilicon films with so called dopant impurities, the dopant impurities having a concentration of 1×10^{17} to 1×10^{23} (see column 5, first paragraph of this document). Consequently, the particular selection of a dopant concentration (boron concentration) of more than 10×10^{20} per se is not taught or suggested from any one of the cited prior art references. As such, since this element is in each of the pending claims, including new claim 33, none of the art of teaches or suggests the pending claims.

The Examiner also asserts that Higuchi teaches a range of concentration including the dopant concentration range of the present invention. The teaching of Higuchi only refers to dopant impurities, however, and Higuchi fails to disclose anything about a combination of dopant atoms with additional impurity atoms so that it is also not rendered obvious by Higuchi to simply transfer the teaching of this document to the teaching of Kalnitsky et al. and to combine both teachings in a similar manner as defined by the new independent claim of the present patent application.

Finally, Oda et al., U.S. Patent No. 6,521,974 does not teach or suggest the bipolar transistor of amended claim 9. Specifically, the Oda reference discloses a bipolar transistor without any reference to any impurities.

Since none of the art of record teach or suggest all of the elements of any of the pending claims, they are all in condition for allowance. Therefore, Applicants respectfully request reconsideration and withdrawal of the 35 U.S.C. § 103(a) rejection to claims 9, 12-16, 24-29, and request allowance of these claims.

CONCLUSION

In view of the above, Applicant respectfully submits that pending claims 9, 12-16, 24, 27-29 and 33 are in form for allowance and are not taught or suggested by the cited references. Therefore, reconsideration and withdrawal of the rejections and allowance of claims 9, 12-16, 24, 27-29 and 33 are respectfully requested.

No fees are required under 37 C.F.R. 1.16(b)(c). However, if such fees are required, the Patent Office is hereby authorized to charge Deposit Account No. 50-0471.

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The Examiner is invited to contact the Applicant's representative at the below-listed telephone numbers to facilitate prosecution of this application.

Any inquiry regarding this Amendment and Response should be directed to Patrick G. Billig at Telephone No. (612) 573-2003, Facsimile No. (612) 573-2005. In addition, all correspondence should continue to be directed to the following address:

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CERTIFICATE UNDER 37 C.F.R. 1.8:

The undersigned hereby certifies that this paper or papers, as described herein, are being transmitted via facsimile to Facsimile No. (571) 273-8300 on this 22nd day of November, 2006.

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